

Elastic Properties of Iron-bearing Wadsleyite at High Pressure and High Temperature	X17B1
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We have carried out an experiment to study the elastic properties of iron-bearing wadsleyite, a high pressure polymorph of olivine, to 8 GPa and 900 K using simultaneous X-ray diffraction and ultrasonic measurements in a DIA-type cubic anvil apparatus (SAM85) installed at beamline X17B1 at NSLS in Brookhaven National Laboratory. A polycrystalline specimen was first hot-pressed in the Stony Brook High Pressure Laboratory and then prepared for acoustic measurements. X-ray diffraction showed that the sample was a single phase of wadsleyite by comparing with the standard spectrum. Ultrasonic measurements were carried out by mounting a Lithium Niobate transducer (10 degree Y-cut, 30 MHz for S wave and 50 MHz for P wave) at the back of the WC anvil. The sample was inserted into a cubic boron epoxy cell assembly with NaCl and BN as surrounding materials, which provides pseudo-hydrostatic stress at high pressures. An alumina buffer rod was inserted between the sample and the anvil inside the boron epoxy cube. The X-ray spectra of the sample were analyzed to obtain the cell parameters and sample volumes from which the sample lengths at high pressure and high temperatures were obtained for velocity calculation. The sample pressure was determined using the Decker pressure scale based on the equation of state of NaCl. A simultaneous pressurization and heating at low pressure was designed to minimize the non-hydrostaticity of the cell assembly. After reaching peak P and T conditions, multiple heating/cooling/decompression cycles were performed to provide dense coverage of experimental data (Fig. 1). Quantitative analysis of the experimental data for reduction of thermoelastic properties is still in progress.

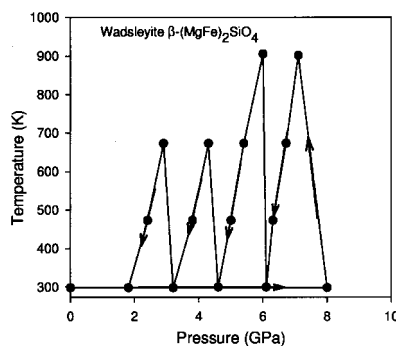


Figure 1. Experimental pressure and temperature path.